

Rejection of Claims 1-24 under 35 U.S.C. §112

As to the rejection of claims 1-24 for indefiniteness in view of the use of the term "nanoclay", applicants submit that that term has definite meaning, both as set forth in the present specification and in the field of technology involved here generally. In this regard, the specification at page 2, first full paragraph, second sentence, states:

The nanocomposites that are suitable for incorporation into the present compositions are preferably montmorillonites (the main fraction of the clay mineral bentonite), which are layered alumino-silicate or magnesium-silicate materials whose individual platelets measure on the order of one micron diameter, giving them an aspect ratio of about 1000:1.

(Emphasis added). At page 5, third paragraph, the specification states:

The preferred nanoclay additive is selected from the group consisting of synthetic silicate montmorillonites, natural layered silicate montmorillonites and a layered alumina-silicate. The individual platelets of the preferred nanoclay additive are approximately 1 micron in diameter. The nanoclay additive is preferably chemically modified to increase its hydrophobicity.

(Emphasis added). Since a micron is equal to 1000 nanometers, and the platelets of the applicants' nanoclays have a diameter of about one micron and an aspect ratio of about 1000:1 (where aspect ratio is defined as being the ratio of edge length to layer thickness (see specification at page 7, first full paragraph, third sentence), the nanoclay particle size is necessarily in the range of one nanometer, at least as to the particle(s) that constitute the platelet layer thickness. The applicants' nanoclays thus satisfy the requirement set forth in paragraph 1 of Office Action, namely, "A nanoclay have to have dimensions of less than micron, i.e. its dimensions have to be measured with nanometers." Applicants therefore submit that the indefiniteness rejection should be withdrawn.

Rejection of Claims 1-24 for Obviousness under 35 U.S.C. §103(a)

In the final Office Action dated August 20, 2002, claims 1-24 were rejected as being unpatentable for obviousness under U.S.C. §103(a) in view of combinations of five or more cited references. Claims 1, 19 and 23 have been amended above to include the limitation requiring that the claimed compositions have a limiting oxygen index (LOI) of at least 45%. The remaining claims all depend from the amended independent claims, and therefore also include the LOI limitation.

Applicants submit that the cited references cannot render the amended claims unpatentable for obviousness because none of the references, either alone or in proper combination, discloses or suggests a non-dripping, flame retardant, fluoropolymeric composition that includes (a) a fluoropolymeric base polymer (in the case of claims 1-22) or a PVDF resin (in the case of claims 23 and 24), and (b) a nanoclay additive, in which the composition has a limiting oxygen index of at least 45%. As set forth in the applicants' specification, and as is also well recognized by persons skilled in the technology involved here, limiting oxygen index (LOI) value is the minimum concentration of oxygen (expressed as percent by volume) in a mixture of oxygen and nitrogen that will support flaming combustion of a material that is initially at room temperature. A higher LOI value indicates a less flammable material. The present specification states (see, for example, pages 1, 3 and 4), flame retardancy is an important characteristic of the applicants' claimed compositions. In this regard, the high LOI values associated with the claimed compositions are identified as contributing to their favorable flame retardancy characteristics. (See specification at page 4). In the experimental batches described in the specification, the

compositions exhibited LOI values no lower than 45.5%. (See specification at pages 10 and 13).

The cited references nowhere disclose or suggest LOI values recited for the claimed compositions. In fact, only Thulliez (U.S. Patent No. 6,054,538) discloses LOI values at all, achieving at best a value of 38%. (See Thulliez, Table at columns 7-8). Thulliez provides no additional teaching regarding LOI values or even flame retardancy in general beyond simply listing LOI values in the table. Ellsworth (U.S. Patent No. 5,962,553) mentions the possibility of adding flame retardants to the disclosed compositions (see column 8, line 7), but provides no further disclosure as to the formation of a composition that includes a fluoropolymeric base polymer and a nanoclay additive and in which the composition has a limiting oxygen index of at least 45%. Ellsworth discloses no LOI values at all. Similarly, Kutnyak (U.S. Patent No. 4,356,284) mentions the possibility of improving flammability characteristics through the use of certain additives, but provides no teaching or suggestion with regard to LOI values (see column 2, lines 41-46). In fact, Kutnyak relates only to polymer compositions, and provides no disclosure, suggestion or motivation to include nanoclay additives in its the disclosed compositions. None of

the other cited prior art references provides any teaching whatsoever as to flame retardancy or the improvement thereof.

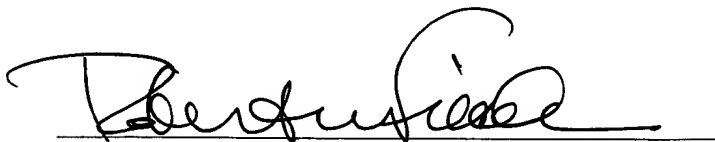
Absent any disclosure, suggestion or teaching as to flame retardant, fluoropolymeric compositions having a limiting oxygen index of at least 45%, the cited references, alone or in combination, cannot render amended claims 1-24 unpatentable for obviousness. Applicants therefore submit that amended claims 1-24 are now in condition for allowance.

* * * * *

In view of the foregoing amendments and remarks, applicants respectfully submit that claims 1-24 are allowable. Applicants also submit that the present amendments and remarks should be entered because no further searching and/or substantial consideration is required and, in any event, the present amendments and remarks place the application in better condition for appeal, if necessary. The Examiner is invited to telephone the applicants' undersigned attorney at (312) 775-8123 if any unresolved matters remain.

Please charge any fees incurred in connection with this submission to Deposit Account No. 13-0017.

Respectfully submitted,



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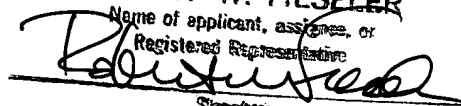
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ATTACHMENT A

MARKED-UP VERSION SHOWING AMENDMENTS MADE

Claims 1, 19 and 23 have amended as follows:

1. (Amended once) A non-dripping, flame retardant, fluoropolymeric composition comprising:

- (a) a fluoropolymeric base polymer; and
- (b) a nanoclay additive;

said composition having a limiting oxygen index of at least 45%.

19. (Amended once) A method for preparing an exfoliated thermoplastic elastomer blend of a fluoropolymer and a nanocomposite, said blend having a limiting oxygen index of at least 45%, comprising dynamically mixing said fluoropolymer and said nanocomposite in a ratio of from about 99:1 to about 50:50 parts by weight, respectively.

23. (Amended once) A non-dripping, flame retardant fluoropolymeric composition comprising:

- (a) PVDF resin; and
- (b) a nanoclay selected from the group consisting of synthetic silicate montmorillonites, natural layered

silicate montmorillonites and a layered
alumina-silicate;
said composition having a limiting oxygen index of at
least 45%.